# INVESTIGATOR'S ANNUAL REPORT

**National Park Service**

**All or some of the information provided may be available to the public**

| | |
|---|---|
| **Reporting Year:**<br>1998 | **Park:**<br>Shenandoah NP |
| **Principal Investigator:**<br>Richard Tollo | **Office Phone:**<br>(202)994-6960<br>**Email:**<br>rtollo@gwu.edu |
| **Address:**<br>George Washington University<br>Department of Earth and<br>Environmental Sciences<br>Washington, DC 20052<br>US | **Office Fax:**<br>(202)994-0450 |

**Additional investigators or key field assistants (first name, last name, office phone, office email):**

No co-investigators

**Permit#:**
SHEN1998N-133B

**Park-assigned Study Id. #:**
unknown

**Project Title:**
Geologic Evolution Of Mesoproterozoic Basement, Blue Ridge Province, Shenandoah Natnional Park, Virginia

| | |
|---|---|
| **Permit Start Date:**<br>Jan 01, 1998 | **Permit Expiration Date**<br>Jan 01, 1999 |
| **Study Start Date:**<br>Jan 01, 1996 | **Study End Date**<br>Jan 01, 2000 |

**Study Status:**
Completed

**Activity Type:**
Research

**Subject/Discipline:**
Geology / General

**Objectives:**
The primary objective of this study is the determination of detailed geologic and geochronologic relationships characterizing metamorphic and igneous basement rocks of Mesoproterozoic age exposed in the Blue Ridge geologic province within Shenandoah National Park. The project involves detailed field mapping and integrated program of petrographic, geochemical and isotopic analyses designed to elucidate petrologic and temporal aspects of the Grenville orogeny.

**Findings and Status:**
During the past year, progress in this research project includes: (1)expanded field mapping and sampling of geologic units, (2)petrographic analysis of thin section samples, (3)major- and trace-element geochemical analyses of selected whole-rock samples, (4)detailed analysis of mineral chemical compositions in representative rocks and (5)U-Pb isotopic analyses of zircons from one of the mapped lithologic units. Field mapping, undertaken both within the Park and in contiguous adjoining areas, has indicated the areal extent and mutual geologic relationships of basement rocks in the Thornton Gap, Old Rag Mountain and parts of the Fletcher USGS 7.5-minute quadrangles. The mapping has demonstrated the existence of a least four major lithologic units including two types of massive charnockite, garnet-bearing gneissic charnockite and leucocratic granitoid. New isotopic analyses of leucocratic granitoid confirm relationships inferred from field mapping and indicate that granitoid intrusion occurred at 1.05 Ga (billion years ago), more than 100 million years after emplacement of massive charnockite. These newly established relationships correct the results of previously published studies. Studies planned for 1999 include: (1)continued field mapping and petrographic analysis, (2)major- and trace-element geochemical analyses of additional whole-rock samples and (3)U-Pb isotopic analyses of zircons from garnet-bearing gneissic charnockite.

**For this study, were one or more specimens collected and removed from the park but not destroyed during analyses?**
No

| | |
|---|---|
| **Funding provided this reporting year by NPS:**<br>0 | **Funding provided this reporting year by other sources:**<br>0 |

| Fill out the following ONLY IF the National Park Service supported this project in this reporting year by providing money to a university or college | |
|---|---|
| **Full name of college or university:** | **Annual funding provided by NPS to university or college this reporting year:** |
| n/a | 0 |